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Title : Fatty acid signature classification patterns amongst beluga whales (*Delphinapterus leucas*), harbour seals (*Phoca vitulina*), and potential prey species in the St. Lawrence estuary, Canada.

Category : Ecology

Student : M.A./M.S.

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Abstract : Fatty acid (FA) signature analysis is a tool that can reveal foraging patterns amongst marine mammals and their prey. Gas chromatography was used to investigate the FA composition of 660 animals sampled in the St. Lawrence estuary including harbour seals (n=43), beluga whales (n=81), and 12 prey species (N= 536). Of 66 detected FAs, those >0.4% by mass of the total FAs were retained to produce 16 logratio variables of potential dietary importance. Exploratory principal components analysis (PCA) produced 3 factors accounting for 80% of the total variance. Factor loadings and scores grouped beluga and seals together on factor 1, distinct from all marine fish and invertebrates in the major saturated and monounsaturated FAs. Factors 2 and 3 were comprised of diet-linked monosaturates and polyunsaturates, respectively. Predictive classification was evaluated with discriminant function (DF) analysis, using the 13 highest-contributing (communalities >0.7) FA logratio variables to correctly classify 90% of all individuals by species. Belugas and seals were separated from prey on the first DF, while being separated from each other and linked to prey on the remaining 12 DFs. These results are consistent with previous findings that the FA signatures of marine mammal blubber reflect but do not match that of their prey. An additional DF analysis using only the 3 factors retained from PCA, classified 57% of individuals by species. Examination of the misclassifications revealed the variability within species groups by age-class or season, and similarities in diet amongst certain species, as suggested by field observations. Future prey modeling should incorporate the variability in seasonal, regional and length-class differences when significant, in order to estimate group contributions to diet using blubber analyses.